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ABSTRACT

Tennessee's Student/Teacher Achievement Ratio project (Project STAR) was designed to study the effects of class size on pupils in primary (K-3) grades. Responses of Project STAR teachers (N=1,003) to the annual Teacher Exit Interview are summarily reported for 1986 through 1989. Generally, the perceptions of teachers in small classes, in regular size classes of about 25 pupils, and in regular size classes with an aide were highly consistent from grade level to grade level. Teachers of small classes explained how their teaching had differed in relation to having only 13 to 17 children, whereas teachers of regular size classes with an aide explained how having a full-time teacher's aide accounted for the differences they experienced. After background and methodological information, contents concern: (1) time and instruction; (2) individualizing instruction; (3) the learning environment in small and regular size classes with aides; (4) conclusions from Project STAR teacher interviews; (5) grouping practices of Project STAR teachers; (6) interaction of teachers with parents and volunteers; (7) teachers' perceptions of work-related problems; and (8) effects of class size reduction and use of full time teacher aides on classroom processes and teacher behaviors. (RH)

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Effects of Class Size on Classroom Processes and Teacher Behaviors in Kindergarten through Third Grade

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Effects of Class Size on Classroom Processes and Teacher Behaviors in Kindergarten through Third Grade

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It is becoming increasingly clear that significant reduction of class size (13-17 pupils) in kindergarten through third grade results in increased pupil achievement as measured by standardized reading and math achievement tests (Achilles, Bain, Folger, Johnston, & Lintz, 1987, 1988; Finn, Achilles, Bain, Folger, Johnston, Lintz, , & Word, 1989; Word, Bain, Folger, Johnston, & Lintz, 1989; Word, Achilles, Bain, Folger, Johnston, & Lintz, 1990). Exactly how teaching and learning changes in K-3 classrooms with fewer pupils is less clear. Relatively little is known about how overall classroom life for teachers and children in small size classes differs from that in regular size classes of about 25 pupils.

The contemporary policy debate about optimal class size often neglects consideration of how classroom life changes when class size is reduced or when teacher/pupil ratio is reduced by use of full time teacher aides. Reviewing 22 studies of class size and teaching practices, Robinson and Wittebols (1986) conclude that smaller classes tend to promote the use of more desirable teacher practices; noting correctly however, that smaller classes do not guarantee that teachers will take advantage of having fewer pupils and modify their teaching practices. Teachers in small size classes were found to use more desirable classroom practices such as more attention to individual children, and more individualization of instruction.

In a review of nine studies using direct classroom observations to measure teaching practices in larger and smaller classes, Robinson and Wittebols (1986) report that six studies found no significant difference in teaching practices; and that three studies found teachers in smaller classes using more desirable practices. Cahen, Filby, McCutcheon, and Kyle (1983), in a qualitative study of changes in instructional processes in teacher and student behavior in small classes also observed positive changes in teaching practices. Johnston and Davis (1989) analyzed interviews with teachers who had taught in small size classes and reported positive changes in several dimensions of quality of life for teachers and children in small classes. Johnston's (1990) analysis of a large number of teacher interviews found that K-3 small class size teachers reported engaging in teaching practices that were more developmentally appropriate and congruent with knowledge of child development (Bredekamp, 1987).

The Tennessee Legislature authorized a statewide 12 million dollar, four year, longitudinal demonstration policy study to consider the effects of class size on pupils in primary (K-3) grades. The Student/Teacher Achievement Ratio project (Project STAR) began in August, 1985 with representatives from Memphis State University, Tennessee State University, University of Tennessee-Knoxville, Vanderbilt University, the State Department of Education, the State Board of Education and the State Superintendent's Association working in a consortium to design, conduct, and monitor the project. The results reported in this paper represent only a small portion of this larger study Achilles, Bain, Folger, Johnston, & Lintz, 1987, 1988; Word, Bain, Folger, Johnston, & Lintz, 1989; Word, Achilles, Bain, Folger, Johnston, & Lintz, 1990).

Project STAR's enabling legislation mandated that participating schools should represent Tennessee's population of inner-city, urban, suburban, and rural schools; and should also be drawn from all three geopolitical divisions of the state. There were 79 schools in 42 school systems that participated in the study. Consideration of the comparisons required by the legislation, as well as other variables, led to development of a within school design. Project staff randomly assigned teachers to each of three class types: small classes (*S*, 13-15 pupils), regular classes (*R*, 22-25 pupils), and regular classes with full time teacher aides (*RA*, 22-25 pupils). The over 7,000 pupils involved in Project STAR were also randomly assigned to each of the three class types by project staff. In general, pupil outcome data were collected regarding academic achievement, academic self-concept and motivation, attendance, and promotion/retention and special education referral status. Age, race, sex, and SES data were also gathered on each pupil. Information was collected regarding parent-teacher interaction, classroom grouping practices, and use of time, and teachers perceived problems. Exit interviews were conducted with teachers at the close of each school year. Project STAR results make an important contribution to the knowledge base about the effects of reduced class size and reduced pupil/teacher ratio on classroom processes and teacher behaviors.

A. Teacher Exit Interview Data Source and Procedures

Project STAR kindergarten through third grade teachers assigned to small size classes, regular size classes, and regular size classes with a full time aide were interviewed by consortium staff at the end of each school year from 1986 through 1989. The broad purpose of these exit interviews was to identify and describe those aspects of classroom teaching that teachers experienced differently in comparison to the previous year's experience in a regular size class. The results of these interviews

provide insights regarding why small size classes and regular/aide classes out performed regular size classes on norm and criterion referenced, standardized measures of reading and math achievement.

The annual Teacher Exit Interview are the primary data source for this section. Interviews were conducted by representatives of the university consortium in May 1986, 1987, 1988, and 1989 with small class teachers (128 kindergarten teachers, 126 first grade, 86 second grade, and 88 third grade teachers); with regular class teacher (101 kindergarten, 113 first grade , 54 second grade teachers, and 55 third grade teachers); and with regular/aide teachers (99 kindergarten, 107 first grade, 71 second grade, and 70 third grade teachers). In sum, over a four year period 1,003 kindergarten, first, second, and third grade teachers participated in related structured, year-end interviews.

1. Kindergarten Teacher Interview Procedures

The primary question explored in depth with each Project STAR kindergarten teacher was: If your experience was different this year than last year, then how was it different? A three stage iterative analysis was performed on the first year (kindergarten) data. In the first stage, teachers' interview response statements were examined to identify and define common themes. In the second stage, interview statements were categorized along the dimensions of those themes. In the third stage a random set of responses, which had been set aside at the outset of the analysis, was used to check the reliability of the theme categories and the coding process. Examination of the 328 kindergarten teacher interviews revealed 17 distinct categories. Three categories addressed project procedures and pupil characteristics and are not addressed in this report. Fourteen categories were identified to address teachers' perceptions of teaching either in a small class, a regular class with no aide, or in a regular class with a full-time aide. Each category is described below.

1. Grouping of pupils - Describes classroom grouping practices and groups. Refers to number of groups, purpose of groups, forming groups, determining group membership, flexibility of group membership over time, use of aides related to groups.

2. Physical environment - Describes features of the classroom physical environment. Refers to amount and use of classroom space, furniture arrangement, heat, light, noise level, and traffic patterns.

3. Learning centers - Refers to the presence of, setting up, provisioning, managing, using, perceived effects of, and quality of learning centers in the classroom. Includes references to use of aides related to learning centers.

4. Social climate - Refers to social interactions among children and between teacher and child. Includes references to cooperation between children, and teacher knowledge of individual children's strengths and weaknesses, both personal and academic.

5. Enrichment Activities - Refers to those experiences and people that provide pupil learning opportunities other than the usual classroom instructional activities; examples include: cooking activities, special art, music or drama, field trips, and invited guests in the classroom. Includes references to planning and carrying out enrichment activities and the use of the aide with enrichment activities.

6. Classroom management - Refers to pupil problem behavior, and includes statements indicating the frequency of problem behavior, the bothersomeness of such behavior, and techniques to prevent and deal with problem behavior.

7. Monitoring and evaluating pupil progress - Refers to monitoring pupil progress, appraising pupil progress, and giving pupils feedback about their progress.

8. Morale and attitude toward work as a teacher - Refers to having a positive outlook, being or not being tired, level of frustration and stress, degree of satisfaction, physical health and well-being, and mental health and well-being.

9. Amount or rate of pupil progress - Refers to amount of material covered, and how quickly pupils grasped the material. Includes references to the aide relative to amount or rate of material covered.

10. Parent-teacher relationships - Refers to how parents are used, problems with using parents in the class, parent-teacher communication, and home-environmental factors.

11. Teacher Aides - Includes responses about having or not having an aide, quality of the aide, use of aide or aide duties, and aide characteristics.

12. Instruction - Includes references to instructional time, purposes, curriculum, instructional goals, teaching methods and techniques, and degree of structure.

13. Teacher planning and preparation - Refers to planning class activities, preparation of teaching materials or the instructional environment. Includes references to paperwork, copying, duplicating, stapling, record keeping, collecting money, etc.

14. Individual attention to pupils - Refers to one-on-one attention or instruction to children. Includes references to reteaching and reinforcement of content as well as pupil counseling.

2. First Through Third Grade Teacher Interview Procedures

The second year (first grade) interview schedule included the fourteen themes identified from the kindergarten interviews. All first grade teachers were also asked to identify any additional differences not covered in the 14 areas; however, no further differences emerged.

The third year (second grade) interview schedule was developed from significant themes that emerged from the previous two years, and from variables identified from research literature on instruction. The 1988 second grade Teacher Exit Interview questions asked teachers to describe differences, if any, that they perceived regarding the following dimensions: (a) amount of content covered, (b) amount of instructional time on task, (c) monitoring children's work, (d) ability to match level of instruction to the ability of individual pupils, (e) pacing of instruction, (f) degree of active student-teacher academic interaction, (g) individual attention to children, (h) classroom social climate, (i) demands on available teacher time, and (j) use of full time teacher aide. These ten dimensions emerged from 1986 exit interviews with teachers (Achilles, et al., 1987), 1987 exit interviews with Project STAR first grade teachers (Johnston, 1988), and instruction research literature. The fourth year (third grade) interview schedule contained a combination of all unique dimensions identified and employed in the earlier kindergarten through second grade interview schedules.

B. An Overview of Project STAR K-3 Teacher Exit Interview Responses

Small, Regular, and Regular/Aide teachers' perceptions of how their experiences differed were highly consistent from grade level to grade level. With few exceptions, the differences reported by K-3 small class and regular/aide class teachers were essentially similar. Interview responses from these two groups differed only in their explanations of the reasons for the differences they described. Small class teachers explained how their teaching had differed in relation to having only 13-17 children, whereas regular/aide class teachers explained how having a full time teacher's aide accounted for the differences they experienced.

The following sections of this chapter present only a summary report of the more detailed kindergarten, first, second, and third grade Project STAR Teacher Exit Interviews. More detailed presentations of the Project STAR teacher interviews are available in other reports (Achilles ,et al., 1987; Johnston, 1989a, 1989b).

C. A Summary of Regular Size Class Teacher Perceptions

Regular size class Project STAR teachers were interviewed each year along with small class and regular/aide class Project STAR teachers. The purpose of the kindergarten through third grade regular class teacher interviews was to monitor the effect of participation in Project STAR on the normal course of schooling in each project school and grade level. Most K-3 regular class teachers reported that there had been no difference between their teaching experience during the project year and the previous year of teaching. The differences that were described by the K-3 regular class teachers focused primarily on differences in their work setting and requirements that resulted from their school system's participation in Project STAR.

Random assignment of both children and teachers to small, regular, and regular/aide classes was a strong feature of the Project STAR research design. However, for many schools this design feature mandated changes in traditional patterns and practices of grouping children in classes within a grade level. The result of randomly assigning children to classes meant that many kindergarten through third grade teachers who had been accustomed to teaching homogeneous ability grouped classes were now faced with teaching classes that were a heterogeneous mix of low, average, and high ability pupils. Some teachers, who for years had been teaching classes composed only of high achieving children, now had to change their teaching practices to accommodate classes containing middle and low achieving children as well. In some instances, Project STAR's random assignment procedures also caused these teachers, for the first time, to teach classes which contained low achieving Chapter I pupils. Also, for some regular class teachers, their school's participation in Project STAR meant slightly smaller classes than the 25-27 children they normally would have had.

D. An Introduction to Small and Regular/aide Class Teacher Perceptions

Small class and regular/aide class kindergarten, first, second, and third grade teacher exit interviews (1986-89) provide useful insights into two related and fundamental aspects of life in primary grades: the process of instruction, and the classroom learning environment. When these teachers described differences in their teaching experiences, they talked about instructional time in relation to rate of pupil progress, instructional pacing, instructional time on task, and demands on the teacher's available time. They talked about instructional processes and strategies in relation to planning, grouping, monitoring pupil work, individualizing instruction, and using learning centers and enrichment activities.

These teachers also described fundamental differences between the overall classroom work environment. They spoke about the classroom's physical environment, interpersonal relations within the class, parent relations, classroom management, and their own morale as teachers.

K-3 Small and regular/aide class teachers described two salient differences in instruction: availability and use of time, and opportunity to individualize instruction.

E. Time and Instruction

Time was a dominant theme observed throughout small class and regular/aide class teacher interview responses. The amount and pace of academic content covered was the most pervasive time difference noted by kindergarten through third grade teachers. Most small and regular/aide class teachers reported covering required content faster and covering more content than they had been able to with a regular class. Teachers reported, for example, covering more required objectives, or completing all grade level reading and math texts. Many explained how they had gone into more depth than ever before. They reported learning that their daily schedule could be more relaxed, and that they would still complete necessary work. This meant, for example, that they could pause to look things up in the dictionary or encyclopedia or that they could spend more time discussing a topic with more children having an opportunity to participate.

1. Variety and Appropriateness of Learning Opportunities

Small and regular/aide class teachers discovered early in the school year that necessary basic instruction required less time, making more time available for other uses. Some teachers used this time to provide a greater variety of learning opportunities for their pupils. For example, teachers described using more manipulative materials and first hand learning activities, including learning centers, math/science and health experiments, and social studies projects. They also frequently cited using more enrichment activities such as creative writing, music, art, drama, newspapers in the classroom, and supplemental activities included in adopted reading and language arts texts. Still others used the new available time to cover the required basic material in more depth. These teachers reported, for example, engaging in more frequent and more lengthy discussions with children, spending the time necessary to insure that each child understood the material, having more opportunities for children to work at the board, and making greater use of reference materials when appropriate.

Regular/aide class teachers explained that the aide could help provision, monitor, supervise, and clean up projects, hands on activities, and learning centers. Small class teachers related how having fewer children meant that implementing such projects was more manageable, that increased available space allowed more movement and pupil interaction, and that monitoring and supervision of these learning activities was easier. Both small and regular/aide class teachers felt that having either fewer children or a full time aide made it easier and less risky to provide a wider range of developmentally appropriate learning opportunities for primary grade children.

2. Individualized instruction

The most prominent change perceived by K-3 small class or regular/aide class teachers was an increase in the extent to which they were able to individualize instruction. Within the bounds of a mandated, structured basic skills curriculum, these teachers reported that they were able to address a wider range of individual learning styles by using more learning centers, more concrete learning materials and activities, and more projects than when they had taught a regular size class. Both small and regular/aide class teachers reported using more small groups. Small class teachers reported allowing children to use a variety of work places as more space was available in the classroom. Teachers felt they were able to tap a wider range of individual pupil interests because they could go beyond the mandated basic reading, language, and math skills curriculum to provide children opportunities for science, social studies, and fine arts content. Because small class teachers had more instructional time available, they were able to respond to each child more frequently, and were able to engage in instructional interactions beyond a simple teacher question/pupil response cycle. Teachers reported that they had more time for extended, indepth questions and conversations.

Teachers reported that with fewer children or with a full time aide instruction took less time because pupils were more on task and could get quick help when needed. Teachers attributed this difference to increased ability to monitor pupil behavior and academic progress, describing how management and supervision was easier with fewer children or with a full time aide. Teachers reported having a better sense of what was going on in the classroom, of what children were or were not doing. Regular/aide class teachers, in particular, felt they were able to deliver unhurried assistance if a child needed it, because the aide was available to monitor and supervise the rest of the class.

Small class teachers also noted that they could make more efficient use of available time because they had more specific knowledge about each child's level and instructional needs.

F. Individualizing Instruction

Increased opportunities for more individualized instruction emerged as a second dominant theme. These differences became apparent as teachers described instructional processes and strategies in relation to planning, grouping, monitoring pupil work, and using learning centers and enrichment activities.

1. Planning and grouping for instruction

Most small and regular/aide class teachers reported no difference between planning for a small or regular/aide class compared to a regular size class, though a few reported spending less time in planning. Several small class teachers reported spending more time planning because the class was constantly progressing and needed fresh challenges. Similarly, several regular/aide class teachers reported spending more time planning the aide's work, in addition to their own. Most small class teachers reported using fewer reading groups, and indicated this made time available for other activities. Small class and regular/aide class teachers also reported that more often than in the past they formed impromptu or specialized groups to better meet more learning levels.

Regular/aide class teachers generally reported that working with groups was easier than when they had no aide assistance. The aide allowed more time for teaching and a greater degree of instructional individualization. Teachers described using the aides to work with individuals and small groups of children who were having difficulty mastering the objectives. Teachers noted that the aide's assistance with clerical and administrative tasks allowed them more time to work with groups. The aides also allowed teachers longer and more uninterrupted periods of small group instruction by monitoring the rest of the class while the teacher worked with the group.

2. Monitoring and evaluating pupil learning

Most small and regular/aide class teachers reported that monitoring and evaluating pupil progress was easier, required less time, was more efficient, and resulted in greater individual attention than was their experience teaching in a regular size class. The most common explanation offered was that with fewer children or a full time aide, papers could be checked on the spot and then give each child immediate feedback. Difficult content could be retaught to individuals or small ad hoc groups as

needed. Similarly, with fewer children or an aide in the classroom teachers were able to monitor children's work more closely during the act of instruction, so that monitoring and reteaching were simultaneous. Several small class teachers indicated that they could use fewer written tests because they had more detailed knowledge of each child's progress based on daily work and their individual interactions with each pupil.

In most cases small and regular/aide class teachers connected the faster, more frequent, and more individualized feedback to increased opportunities for immediate reteaching. These teachers stated they were better able to match instruction to the needs of above and below average pupils in the class because of the improved monitoring. Second and third grade teachers in particular noted that children who were having problems were more likely to ask questions and request help than in a regular class. Many teachers explained that the improved monitoring was connected to greater opportunities for individualized enrichment activities for children.

A concern expressed by a few small class teachers was that increased monitoring was necessary because small class pupils had come to depend on quick help or feedback from the teacher. One teacher explained that "kids have come to expect more monitoring," and another noted that "children almost demanded more immediate feedback." Another teacher who observed that the children had grown accustomed to the increased attention from and interaction with her, also pointed out that in exchange her children were more willing to ask questions, and more willing to say that they did not understand.

While most regular/aide class teachers reported that they had a better sense of individual pupil progress, a few regular/aide teachers expressed a contrasting concern. Some teachers noted that because the aide was checking most of the papers, the teacher was not as aware of what immediate reteaching was needed by each child.

3. Matching instructional and pupil ability levels

In general, small and regular/aide class teachers indicated that it was much easier to match the level of their instruction to the level of the pupil's ability than it had been when they taught in a regular size class. Their explanations for why this was easier related to having more detailed and accessible knowledge of pupil ability levels, and to having the time to provide immediate, individual attention to pupils.

The narrow confines of the prescribed basic skills curriculum do not accommodate a wide range of developmental interests and abilities. However, small and regular/aide class teachers reported that because they had time and more opportunity for individual instruction, children who were having great difficulty learning the

required basic skills could be accommodated. A number of small class teachers explained that they had been able to avoid retaining children in grade because they were able to provide more attention to those children. Similarly, a number of teachers reported that they were better able to meet the needs of children whose knowledge and skills were beyond the range of the specified curriculum. In sum, reduced class size and reduced teacher/pupil ratio contributed to teachers being able to better meet the needs of children outside the range of the basic skills curriculum.

Some second and third grade small class teachers reported that their classes were more homogeneous than any class in the past, so matching the level of instruction was not difficult. Small class teachers reported that in particular it was easier to individualize instruction for pupils having learning problems than it was in a regular class. Having the time available for immediate monitoring and reteaching was described as critical in this regard. Recall that some teachers perceived pupils in small class to be more willing to seek the teacher's help. Others have observed that in contrast to children in regular classes, children in small classes acted to adjust the match between the level of instruction and their own ability level by demanding help if they were having trouble.

Regular/aide class teachers described an improved match as a result of the aide working one-to-one with children who were having difficulty learning. They described how the aide contributed to an improved instructional match through increased use of learning centers and enrichment activities. Regular/aide class teachers described how the aide was used as a roving tutor to answer children's questions who were engaged in assigned seatwork while the teacher was leading small reading groups. They described how the presence of the aide to supervise and monitor the class allowed the teacher to work one-on-one or in small ad hoc groups with children who were experiencing difficulties. Finally, regular/aide class teachers described how the presence of the aide provided more detailed knowledge of each child's ability level, thus allowing a more precise match of assignments and ability.

4. Teacher-pupil academic interaction

Most small and regular/aide class teachers responded that they had experienced significant differences in the degree of active pupil-teacher academic interaction when compared to their experience teaching in a regular size class. Generally small class teachers described class discussions as more frequent and reported that all children in the class tended to be involved in these discussions. Teachers reported that they employed more higher level thinking activities, and that they were better able to insure that all children could participate.

Both small class and regular/aide class teachers reported that they were able to respond more quickly and more appropriately to children who needed assistance with assignments than they had been able to in a regular class. With fewer pupils in the class or with the presence of an aide, children did not have to wait as long to receive help from an adult. Children's questions could be answered more quickly. Responses to children were more individual and private. Teachers reported that they, or their aide, were able to spend more time with children who needed assistance. Adult-child interactions were more relaxed and less hurried.

Second grade and particularly third grade small class teachers observed that the children appeared to be less inhibited, less afraid of being wrong and that they volunteered to answer questions more often. One teacher observed, "They feel safe with their ideas and they're not going to be put down." Teachers described children in small classes as more curious, enthusiastic, and eager to participate than were children in their regular classes. Several teachers noted this was particularly the case in their low achieving reading group.

Some regular/aide class teachers related that having two adults in the classroom meant that children could receive twice as much interaction as before. Others described how the presence of the aide resulted in more personal attention to individual children, and improved knowledge of children as individuals. Some regular/aide class teachers explained that the instructional time spent with children was more concentrated because having the aide in the classroom meant that behavior was better and therefore the teacher could devote undivided attention to those children she was teaching.

5. Learning centers and enrichment activities

Small and regular/aide class teachers reported providing children with learning opportunities beyond traditional whole group and seatwork instructional patterns more often than they had been able to provide when teaching a regular class. In particular, they described using more learning centers and implementing activities such as cooking, special art, music, drama, field trips, science and math experiments and demonstrations, social studies projects, creative writing, and parent or volunteer speakers from the community. They also reported making more use of supplemental instructional materials and enrichment activities provided in the adopted reading and math textbooks. Teachers appeared to be more willing to implement complex or messy activities because more classroom space was available or because they, or they and the aide, could adequately monitor and supervise the activity.

Small and regular/aide class teachers also reported having time to make more use of learning centers than they could in a regular class. Small class teachers noted that with fewer children each could go to centers more often and stay for longer periods of time. They observed that the quality of time children spent in centers was better than before, children were not as rushed, there was more available space, and there were fewer children to share limited materials. These conditions contributed to less friction, and fewer discipline problems during center work. Moreover, small and regular/aide class teachers reported improved ability to monitor and supervise children working in centers.

G. The Learning Environment in Small and Regular/Aide Classes

Teachers experienced fundamental differences in the physical, social, and emotional classroom work environment in small and regular/aide classes as compared to their experiences in regular classes. They told interviewers about the classroom's physical environment, interpersonal relations among teacher and pupils, parent relations, classroom management, and their own morale as teachers. Differences in availability and use of time during the school day, and opportunity to know and respond to children on a more individualized basis characterized small and regular/aide class teacher perceptions of their classroom environment.

1. Interpersonal relations

Small and regular/aide class teachers indicated that they had better knowledge of children as individuals, their families and their home background; that their relations with children were improved; and that children's relations with each other were more positive. Teachers reported that more time was now available to *listen* to children, to learn about their personal lives and concerns. Conversely, teachers also perceived that children knew more about the teacher as an individual with a history, interests, and a life outside of school. Teachers reported feeling more like a part of the class. Small class teachers noted that children were more willing to approach the teacher, that they more frequently initiated conversation with teachers about personal matters.

Differences in relations among children were consistently noted by small class teachers. Small classes were frequently described as like a family. For the most part children in small classes were described as unusually cooperative, supportive, tolerant, and caring. Teachers noted that children stood up for each other, and that children were more willing to take risks in class. Children encouraged classmates to

try, and they would not accept less than a good effort from their peers. Small class teachers described their group as more cohesive, and noted that there was less bickering than in regular classes.

Both small and regular/aide class teachers reported differences in their ability to respond to personal (non-academic) needs of the children in their classes. The pace of classroom life was perceived to be more relaxed. Small class teachers felt less time pressure, and regular/aide class teachers noted that with two adults in the classroom it was more likely that an adult would be available to listen to children when they needed to talk about a personal matter.

There is some evidence, particularly from small class teachers, that children had more opportunity to communicate with the teacher and that children also had more opportunity to communicate with each other. Teachers reported providing children more opportunities to work together in small groups. Some small class teachers reported that because there were fewer children present in the classroom, that they were able to allow more talking among children. Some small class teachers reported higher noise levels than in the past, but noted that this was not a problem because the noise seemed to be more productive. These teachers reported that with fewer children it was not as necessary to maintain tight control of children's movement and interaction. Again, small class teachers reported that because classroom life was more relaxed they tolerated more movement and interaction.

An unavoidable feature of Project STAR's within school research design meant that children attending small schools serving stable school populations spent four years in a small class with essentially the same fifteen or so classmates. It could be argued that the closeness among children resulted from being together in the same small group for four years. However, kindergarten teachers made the same observations about relations among children, and to the same degree as did their first, second, and third grade counterparts. Some second and third grade teachers reported that when the small class membership had remained essentially intact for three or four years, children often did not get along well, and were not receptive to new classmates entering the group. This finding appears to be an artifact of the research design, and was not reported in instances where small group membership varied from year to year.

Kindergarten through third grade regular/aide class teachers were overwhelming in their response that there had been more individual attention to pupils as compared to their experience teaching in a regular class without aide assistance. Teachers reported that children received more emotional and social attention from the teacher and the aide. The pace of the classroom was more relaxed and teachers commented

that they were more relaxed and more open to non-academic interactions with children. Teachers did not feel as rushed because the aide was there to handle matters if necessary. Many teachers explained that with two adults in the classroom it was possible for someone to be available to listen to children when they needed to ask an academic question or when they needed to talk about a personal matter.

2. Classroom Physical Environment

Small class teachers identified increased classroom space, better use of classroom space, and lower noise levels when describing the differences between teaching in a small size and in a regular size class. Teachers referred generally to "more space" reporting that they kept the same room arrangement but simply spread out more; some citing increased space between children's desks, while others noted broader pathways for movement within the room. Teachers reported allowing children more freedom to move about the room than they had in a regular class.

When small class teachers spoke in detail about how they utilized the increased space resulting from fewer children in the room, they more frequently reported providing more activity/interest/learning centers, as well as increased space for children to work on the floor for art projects, games, reading, and for increased opportunities for children to work in partners and small groups for independent, cooperative learning. They variously described lower noise levels in the classroom, higher levels of productive noise, and their own increased tolerance for noise and movement.

Regular/aide class teachers reported that the aide helped to better manage available classroom space by monitoring and directing the traffic flow while the teacher was engaged in instruction. Several teachers noted that the noise level was lower because the aide helped keep things quiet, particularly when the teacher was engaged in instruction. In contrast, some teachers noted that having two adults working in the classroom at the same time resulted in higher noise levels. Some perceived this to be a distraction, others did not mind since it was productive noise.

3. Managing the behavioral environment

Adult-child interactions regarding children's behavior emerged as a major area of difference between teaching in regular classes and teaching in small or regular/aide classes. The overwhelming response from small and regular/aide class teachers was that there were fewer discipline problems than they had experienced in a regular class. When discussing why there were fewer discipline problems in a small class, several themes emerged. The most frequent explanation was that with fewer children and

desks in the classroom, there was more physical space between children. Thus, it was not as likely that children would talk to each other, disturb each other, or jostle others when moving about the classroom. Some teachers pointed out that with more classroom space it was easier to physically isolate children with behavior problems.

A second explanation for the decreased number of discipline problems was that with fewer children it was "easier to stay on top of things." By this teachers meant that it was easier to scan the classroom to monitor pupil behavior. Teachers reported that children were aware that teachers could watch them more closely, and were therefore less likely to misbehave. Teachers also reported that they were able to deal with problem behavior right away, that they were "able to catch small things before they could escalate." This may have contributed to less misbehavior since children knew that not only was there a higher probability that the teacher would see them, but also that the teacher would take immediate action to deal with the misbehavior. Teachers also mentioned increased available time as a factor contributing to their increased "With-it-ness." As one teacher described, "I had more time to prevent behavior problems from happening and more time to deal with them if they did."

A third explanation for decreased misbehavior revolved around individual attention. Several teachers explained that they had more time to work with each individual child, noting that children learned that they would all get attention from the teacher. As one teacher explained, "The kids knew that they didn't have to act up to get my attention." Other teachers reported that they were able to pay more individual attention to children who had behavior problems, particularly those with more serious or difficult problems. Increased communication with parents was one aspect of this individual attention, both to inform parents about positive as well as problem behavior.

There were several positive outcomes that resulted from teachers' ability to manage their classes so there was less problem behavior. Several teachers reported using less corporal punishment than they ever had before. Others indicated that they gave children more freedom to talk quietly and move about the room since it was easier to monitor children's behavior and to deal immediately with problem behavior. Both small and regular/aide class teachers described how they were able to respond to a child's problem behavior in a more private and individualized fashion than when they were alone in a class of 25 or so. The more relaxed pace of classroom life allowed teachers the opportunity to talk with children about persistent or difficult problems. Because they had a better understanding of children as individuals and of their life outside of school, teachers felt they were better able to solve behavior problems rather than simply controlling or repressing them.

4. Quality of teacher work life

Small and regular/aide class teachers reported differences in their morale and work attitudes. Teachers reported feeling more relaxed, less pressured, and more satisfied at the end of the day. They felt more less pressured because they knew they would be able to get the required basic instruction completed. They felt more satisfied because they were able to interact more frequently with each child on both a personal and academic level, because they did not have to be as controlling, and because they had the time to more be flexible in meeting individual pupil needs using more developmentally appropriate approaches. Their satisfaction extended to their home life, with many teachers reporting that they did not take as much work home as they had when teaching a regular class. In sum, small and regular/aide class teachers felt as though they could accomplish more using more desirable methods than they could when teaching in a regular class.

H. Conclusions From Project STAR Teacher Interviews

Based on four years of interviews, the following differences were apparent between instruction in small and regular/aide classes, and instruction in regular classes. Basic instruction was completed more quickly providing more time for covering additional basic material, use of supplemental text and enrichment activities, more indepth instruction regarding the basic content, more frequent opportunities for children to engage in first hand learning activities using concrete materials, and increased use of learning centers. These patterns emerged in kindergarten and continued through the third grade.

Improved individualized instruction also emerged as a dominant theme in teachers perceptions. Again citing extra available time as the crucial factor, small and regular/aide class teachers reported increased monitoring of pupil behavior and learning, opportunities for more immediate and more individualized reteaching or enrichment, more frequent interactions with each child, and a better match between each child's ability and the instructional opportunities provided. Small and regular/aide class teachers perceived that they had a more detailed knowledge of each child's needs as a learner and the necessary time to meet individual learner's needs using a variety of instructional approaches. Small class size or the presence of a full time teachers aide fostered the increased use of learning approaches generally considered by educators to be highly desirable primary grade practices.

Significant reduction of class size, or the addition of a full time teacher's aide also made positive changes in the physical, social, and emotional environments in primary grade classrooms. Classrooms were more pleasant for both teachers and students. Teachers and students were under less stress and learning occurred in a more relaxed atmosphere. Students were less likely to get lost in the crowd, and were more likely to have their own unique needs met by adults who understood them as individuals. The extent to which teachers, aides, and children were friendly, supportive, and trusting of one another is an indication of the peer cohesion of children and the esprit de corps of the group as a whole (Johnston & Davis, 1989). Further this dimension is an indicator of classroom morale and sense of team spirit and is known to be characteristic of effective elementary schools.

I. Teacher Grouping Practices

Grouping practices of all Project STAR K-3 teachers were explored through a self-report instrument, the Instructional Grouping Practices questionnaire. Teachers were asked to report, in relatively low inference terms, information about the ways in which they arranged children in groups for instruction: in what subjects children were grouped or a regular basis, the number of groups in reading and math, criteria employed in assigning children to groups, and the extent to which children were moved from one group to another during the school year.

Few differences were observed between K-3 small, regular, and regular/aide class teachers instructional grouping practices. K-3 teachers, regardless of class type, continued to form small instructional groups for teaching reading; whereas math instruction was generally carried out with the whole class. Given Tennessee's structured, mandated basic skills curriculum and concomitant teacher evaluation procedures, it is not surprising that traditional grouping practices for math and reading instruction are resistant to change as a result of reduced class size.

Project STAR K-3 teachers were most likely to employ three small groups for reading instruction and to teach math to the class as a whole group. While none of the differences were statistically significant, small and regular/aide class teachers more often used two or more groups for math instruction than did their regular class counterparts. Similarly, small class teachers more often reported using fewer reading groups than did regular or regular/aide class teachers, though again, the mean number of groups was not significantly different. Skill level was the primary basis for assigning children to reading groups, and most teachers (86%) reported that they occasionally moved children among groups throughout the year.

1. Summary and discussion

Project STAR K-3 teacher responses to the *I*nstructional Grouping Practices questionnaire provide no surprises. No significant differences in responses to the questionnaire items were noted among class types. As expected, almost all teachers did group for instruction in reading; whereas only about a fourth reported forming instructional groups on a regular basis for teaching math. Also as expected almost no teachers formed instructional groups on a regular basis for teaching science or social studies.

Small class teachers averaged slightly fewer reading instructional groups than did regular class teachers. Regular/Aide class teachers have slightly more reading groups than either small or regular class teachers. Small and regular/aide class teachers more frequently reported using two or more groups for math instruction than did regular class teachers.

Children were assigned to reading groups based on their skill level. Since most math instruction occurred in a whole class, single group format, ability grouping was not employed. When teachers did group for math instruction, children were assigned to groups based on their skill level. It appears that when instructional groups are employed, as in reading, children are moved among groups during the year.

The picture that emerges from the Project STAR K-3 teacher responses on the *I*nstructional Grouping Practices questionnaire supports the view that the fundamental organization of classroom instruction is not affected by significant reduction in class size or by the addition of full time teacher aides (Cahen, et al., 1983, Mitchell, et al, 1989). Some regular/aide class teachers did employ more groups for reading and math, and some small class teachers did form smaller groups for math instruction. On the whole, however, most teachers did not take advantage of smaller classes or teacher aides to change their basic approach to grouping for instruction.

As noted above, the presence of a structured basic skills curriculum in combination with a teacher evaluation system that is closely linked to adherence to the curriculum exerts strong pressure on classroom teachers to maintain traditional practices. Moreover, teachers received no training in alternative grouping approaches or instructional strategies related to new grouping possibilities. Thus, the effect of reduced class size or a full time teacher's aide in combination with focused training and the opportunity for curricular modification is not known.

The Project STAR K-3 *I*nstructional Grouping Practices questionnaire did not address the extent to which teachers employed temporary or ad hoc instructional groups. However, the K-3 teacher exit interviews indicate that small class and regular/aide class teachers made more frequent use of ad hoc instructional groups

than they had when teaching in a regular class. Moreover, regular class teachers did not report these differences during the exit interviews.

J. Parent/Volunteer-Teacher Interaction

Interaction between parents, volunteers and Project STAR K-3 teachers were examined using the self-report instrument, Parent/Volunteer-Teacher Interaction questionnaire.

Teachers were asked to indicate the weekly, monthly, and yearly frequency of a variety of contacts with parents and other volunteers. They were asked to report the nature, method, and weekly frequency of contacts with parents about their child's learning or behavior. The monthly frequency of a hierarchy of parent/volunteer involvement activities in the classroom; and the monthly and annual frequency of home visits. They were also asked to indicate their overall satisfaction with the level of parent-teacher interaction in their classroom.

1. Communication with parents

Teachers were asked to report the weekly frequency of contacts with parents about misbehavior or learning problems, and about good behavior or learning accomplishments-- how frequently during the past full week they had made phone calls, sent notes home to parents, or held face to face conferences. Teachers were also asked to indicate the frequency with which they sent home suggestions for activities to be done at home, or information about topics of study. No significant differences were found among small, regular, and regular/aide class teacher responses to these items; though small class teachers consistently averaged slightly fewer contacts with parent regarding pupil behavior or academic performance than did regular or regular/aide class teachers. Similarly, regular/aide class teachers averaged slightly more contacts with parents regarding classroom activities and ways that parents could support their child's learning at home than did regular class or small class teachers. Most teachers, regardless of class type, reported that within the previous four weeks, they had sent four written communications about curriculum matters home to parents. This once a week pattern is consistent with general primary grade practice. Most K-3 teachers reported that they did not make professional visits to pupil's homes. No significant class type differences were observed for those teachers (between 10-15%) who reported making such visits.

2. Parent/Volunteer Involvement in the Classroom

Teachers indicated the monthly frequency with which parents or volunteers were involved in different levels of classroom activities. Teachers were asked about involving parents or volunteers in (a) maintenance tasks, (b) supervision tasks, (c) clerical tasks, (d) drill-teaching tasks, and (e) creative teaching tasks. No significant differences were found among small, regular, and regular/aide class teacher responses to these items. It should be noted that among K-3 teachers overall, regular/aide class teachers made slightly less frequent use of parents or volunteers than did small size or regular class teachers. This finding is consistent with teacher interviews with regular/aide class teachers in which they explained that since they had a full time aide, they did not have as much need to involve parents or volunteers.

3. Summary and discussion

There appears to be neither significant differences nor readily observable patterns of differences in parent/volunteer-teacher interaction among small, regular, and regular/aide class teachers. Perhaps because the perceived need was greater, regular class teachers reported more frequent involvement of parents in classroom activities and support than did small or regular/aide class teachers. Throughout the K-3 grades, having a full time teacher aide assigned to a teacher appeared to reduce the need for and hence the frequency of involvement of parents or volunteers in classroom activities. Also, small class teachers appeared more likely to phone, write, or confer with parents about pupil accomplishments and good behavior than did regular class teachers. Small class teachers also reported slightly less frequent communication with parents regarding pupil misbehavior or learning problems. One possible explanation for this finding emerges from the teacher interview data. Small class teachers reported that they were better able to prevent problem behavior from happening, and to solve misbehavior problems in class. In short, small class teachers may have not felt the need to involve parents in solving classroom behavior problems.

K. Teacher Problems

To examine the relationship between teachers' perceptions of their work related problems and class type, Project STAR asked K-3 teachers to complete a slightly modified version of the Teacher Problems Checklist (Cruickshank & Myers, 1980). This instrument, modified by the addition of a single item regarding teacher aides, consists of 61 problem statements to which teachers responded on a five point Frequency scale (always, occasionally, never) and on a five point Bothersome scale

(extremely, somewhat, not at all). Thus for each of the 61 specific problem statements, teachers provided information about the extent to which the problem was perceived to be bothersome and the frequency with which the problem was experienced.

No significant differences were observed between class type and teacher perceived problems. For K-3 teachers, regardless of class size, problems related to time were more frequent and more bothersome than other types of problems. The three problem statements: (a) *I* have a problem having enough time to teach and also to diagnose and evaluate learning, (b) I have a problem having enough preparation time, and (c)*I* have a problem having enough free time, were consistently observed to be the top ranked problems both for Bothersomeness and Frequency for all kindergarten through third grade teachers.

1. Discussion

The extensive literature on teacher problems (Veenman, 1984) strongly suggests that classroom management and control of pupil classroom behavior is the most significant problem area for teachers. The findings from Project STAR contradict this view of teacher problems, and indicate that problems related to time are the most frequent and bothersome work related problems perceived by these K-3 teachers. Other recent studies (Bainer, 1988; Hines Mann, Swarzman & Hogan, 1988; and Manaf, 1987) also report time to be the most prominent global area for elementary school teachers, and suggest it may be due to increased accountability expected of teachers, and to additional content topics added to the traditional reading, language arts and math subjects normally taught in the early elementary grades. The ascendancy of time as the most troublesome problem area may be the result of a pervasive and salient focus on time and how best to use it in schools. Tennessee's basic skills curriculum is complex and teachers are held accountable for seeing that pupils progress through the specified curriculum at the expected rate. In many Tennessee schools teachers are accountable to supervisors and evaluators who step into their classroom and expect to find the teacher covering a particular unit, in a particular fashion, at a particular time. Thus, it is not surprising that Project STAR teachers perceive time to be a salient and bothersome problem area.

L. Summary of Effects on Classroom Processes and Teacher Behaviors

Class size reduction and the use of full time teacher aides does move curriculum in the direction of more developmentally appropriate practice (Bredekamp, 1987). The effect, however, appears to be limited, particularly by the presence of a single structured curriculum organized around direct instruction of reading, language, and

math basic skills. Class size reduction or the use of full time teacher aides does contribute to increased opportunities for children to select from a somewhat wider range of learning activities; they contribute to a more individualized application of the mandated curriculum; they contribute to increased teacher awareness of their student's social and emotional development; and they contribute to increased opportunities for children to interact with each other while engaged in learning activities. Moreover, small class sizes or the use of full time aides appear to contribute to richer content and more indepth coverage of subject matter content.

Bredekamp (1987) asserts that the developmental appropriateness of an early childhood program is most apparent in interactions between adults and children. Significant reduction of class size or the presence of a full time teacher's aide appears to make a positive contribution to the developmental appropriateness of adult-child interactions in the primary grades. These contributions are apparent both in instructional interactions and in personal non-academic interactions. Within the confines of a structured, highly prescribed reading, language, and math basic skills curriculum, K-3 classes of about 15 children or classes of 25 children with a teacher and a full time paraprofessional seem to foster instructional interactions that are more individualized than does the more traditional class size of about 25 children with a single teacher. Small class teachers are more knowledgeable about the instructional needs of the children in their classes. Small and regular/aide class teachers are more likely to report employing teaching strategies that are considered to be developmentally appropriate than do teachers in regular size classes of about 25. Small classes, and to a lesser extent regular/aide classes foster more developmentally appropriate non-academic interpersonal interactions between adults and children and among children themselves. Reduction of class size or the presence of a full time teacher's aide appears to have resulted in increased positive attention to children's social and emotional growth and development. Small and regular/aide class teachers reported that they were more cognizant of children's individual social and emotional needs and problems than they had been in the past.

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